

PATENT ABSTRACTS OF JAPAN

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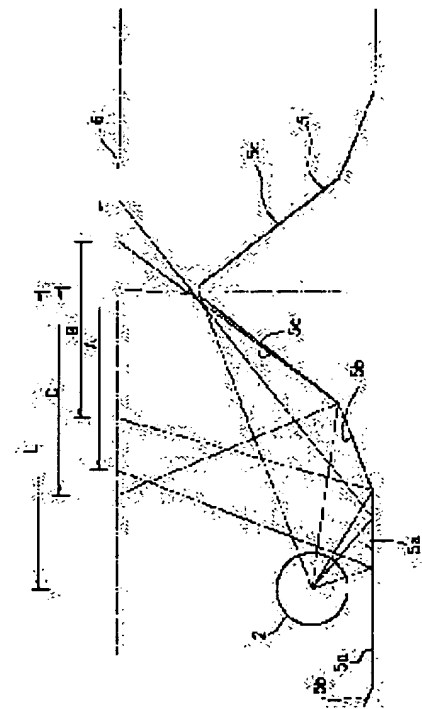
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(54) PERPENDICULAR TYPE ILLUMINATION DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To facilitate the manufacturing of a perpendicular type illumination device by decreasing the number of reflection surfaces of a reflection plate in the device and simplifying it, and to secure high luminance and high uniformity by preventing reduction of luminance and uniformity caused by simplifying a reflection plate.

SOLUTION: A reflection plate 5 of the perpendicular type illumination device is made of three sectioned reflection surfaces of a reflection plate 5a of a light source side, a reflection surface 5b of an intermediate part, and a reflection surface 5c of a side being apart from the light source, while, supply regions of reflected light by these reflection surfaces 5a, 5b, 5c for an illumination surface



6 are designated as A, B, C respectively, A is directed to a wide region of the illumination surface 6, B and C are directed to a center position between light sources or a position adjacent to the center position it, while luminance and uniformity are secured by making B and C transgress the border to the adjacent light source side slightly by the prescribed width from the center position between light sources.

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CLAIMS

[Claim(s)]

[Claim 1] So that the reflected light of the light source of parallel a large number and this light source may be supplied to a lighting side, respectively Equip each light source with the reflecting plate which made bilateral symmetry and was made into the common configuration, and this reflecting plate is made into a cross-section horizontal. It is made the upward dip of the reflector by the side of the light source which supplies the reflected light to the area A of a lighting side, a cross-section straight line, or a **** bow. While having and forming the reflector of 3 partitions in one side of each light source by the reflector by the side of the light source isolation which makes it the middle reflector which supplies the reflected light to the area B of a

lighting side, and the upward dip of a cross-section straight line, and supplies the reflected light to the C region of a lighting side While carrying out the polymerization of the above-mentioned area B and the C region to the above-mentioned area A on the basis of the broader-based exposure range of the above-mentioned area A Area B so that the border may be crossed from the mid gear between the contiguity light sources to a contiguity light source side in about 0 - 20%, and a C region to the separation of the light source of a lighting side, and the mid gear between the contiguity light sources, respectively in the range of the width of face similarly made into about 0 - 10% The direct female mold lighting system characterized by coming to set up the reflected light supply field in the above-mentioned middle reflector and the reflector by the side of light source isolation.

[Claim 2] The direct female mold lighting system according to claim 1 characterized by coming to set up the field of the reflected light supply in the above-mentioned middle reflector and the reflector by the side of light source isolation so that this area B may be located in the mid-gear side between the contiguity light sources from the above-mentioned C region, while setting the above-mentioned area B as narrow from the above-mentioned C region.

[Claim 3] The direct female mold lighting system according to claim 1 or 2 characterized by becoming as an include angle which makes the reflector by the side of the light source isolation which adjoins the include angle of the reflector by the side of the above-mentioned light source isolation, a right angle, or the acute angle of about 70 degrees or more.

[Claim 4] The direct female mold lighting system according to claim 3 characterized by making it a cross-section straight line or a **** bow, and becoming as a single reflector of upward dip so that the reflector by the side of the light source isolation which makes the include angle of the reflector by the side of the level light source, the above-mentioned right angle, or the acute angle of about 70 degrees or more for the above-mentioned middle reflector may be connected.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the direct female mold lighting system which arranges much light sources to parallel and illuminated the liquid crystal display side, the display lighting side, etc. from the tooth back.

[0002]

[Description of the Prior Art] As this seed direct female mold lighting system is shown in this invention person's application for patent No. 113423 [2000 to] Each light source should be equipped with the reflecting plate which made bilateral symmetry and was made into the common configuration so that the reflected light of the light source of parallel a large number and this light source might be supplied to a lighting side, respectively. Generally a reflecting plate The lighting which secured brightness and homogeneity as much as possible as a whole should be made by supplying the reflected light which equipped about the 7-8th page with the multiple reflector by crookedness processing or bow processing, and compounded the ingredient of high reflexivity with the lighting side.

[0003]

[Problem(s) to be Solved by the Invention] In this case, although the direct female mold lighting system which secured brightness and homogeneity to altitude is obtained When a reflecting plate is constituted as an ingredient of high reflexivity using white foaming resin, such as a polyester foaming sheet which has a foaming side, on a front face, while foaming resin has elasticity, generally since shock resistance is low While fracture can be caused at the time of crookedness processing or bow processing or the predetermined include angle of a reflector cannot be obtained, so that a direct female mold lighting system may be made into a thin shape, for example If the cold cathode fluorescent lamp of for example, the diameter of 3mm - 4mm is used for the light source and a lamp pitch is made into a 24mm - about 30mm thing Since the path of this cold cathode fluorescent lamp is small, when the reflector of a reflecting plate becomes a narrow width, processing of a reflector carries out elaboration and the trouble on reflecting plate manufacture that formation of a reflector becomes difficult is left behind.

[0004] It is in offering the direct female mold lighting system which this invention was made in view of this situation, and the place made into the solution technical problem cancels the brightness brought about by being simplified while simplifying the number of reflectors as much as possible so that manufacture of a reflecting plate can be easy-ized, and homogeneous lowering, makes it high brightness, and can realize high homogeneity.

[0005]

[Means for Solving the Problem] In one side of each light source, a medium and isolation light

source side classifies the reflector of a reflecting plate three times a light source side, and incline a horizontal in a light source side and a dip thru/or bow, and isolation light source side is made for this invention to incline medium along with the above-mentioned technical problem. While simplifying the number of reflectors as much as possible, the wide area of a lighting side is received in the reflector by the side of the light source by supposing that it is level. By covering the mid gear between the contiguity light sources preponderantly, while supplying the reflected light, and making the field of reflected light supply of the lighting side by the middle reflector and the reflector by the side of the isolation light source lap with the field of the above-mentioned wide area The relation between reflectors by the side of medium and the isolation light source is set up the above-mentioned light source side, and the advanced brightness and the homogeneity of a lighting side are secured. Invention according to claim 1 The light source of parallel a large number, It is made each light source at bilateral symmetry so that the reflected light of this light source may be supplied to a lighting side, respectively. It is made the upward dip of the reflector by the side of the light source which is equipped with the reflecting plate made into the common configuration, makes this reflecting plate a cross-section horizontal, and supplies the reflected light to the area A of a lighting side, a cross-section straight line, or a **** bow. While having and forming the reflector of 3 partitions in one side of each light source by the reflector by the side of the light source isolation which makes it the middle reflector which supplies the reflected light to the area B of a lighting side, and the upward dip of a cross-section straight line, and supplies the reflected light to the C region of a lighting side While carrying out the polymerization of the above-mentioned area B and the C region to the above-mentioned area A on the basis of the broader-based exposure range of the above-mentioned area A Area B so that the border may be crossed from the mid gear between the contiguity light sources to a contiguity light source side in about 0 - 20%, and a C region to the separation of the light source of a lighting side, and the mid gear between the contiguity light sources, respectively in the range of the width of face similarly made into about 0 - 10% It considers as the direct female mold lighting system characterized by coming to set up the reflected light supply field in the above-mentioned middle reflector and the reflector by the side of light source isolation.

[0006] So that in addition to the above invention according to claim 2 may secure advanced brightness and homogeneous reservation as much as possible easily and may make them the thing of a desirable gestalt While setting the above-mentioned area B as narrow for this from the above-mentioned C region, this area B so that it may be located in the mid-gear side between the contiguity light sources from the above-mentioned C region It considers as the direct female mold lighting system according to claim 1 characterized by coming to set up the reflected light supply field in the above-mentioned middle reflector and the reflector by the side of light source isolation.

[0007] Similarly above invention according to claim 3 in addition, by making the include angle of the reflector by the side of the above-mentioned light source isolation into the thing of the predetermined range So that the brightness of the above-mentioned altitude and homogeneity may be secured as much as possible easily and it may consider as the thing of a desirable gestalt, while being able to simplify the number of reflectors It considers as the direct female mold lighting system according to claim 1 or 2 characterized by becoming as an include angle which makes the reflector by the side of the light source isolation which adjoins the include angle of the reflector by the side of the above-mentioned light source isolation in this, a right angle, or the acute angle of about 70 degrees or more.

[0008] Similarly above invention according to claim 4 in addition, by using the reflector by the side of the above-mentioned light source isolation which carries out contiguity So that the reflector by the side of the light source isolation which makes [this] the include angle of the reflector by the side of the level light source, the above-mentioned right angle, or the acute angle of about 70 degrees or more for the above-mentioned middle reflector may be connected that it seems that a middle reflector shall be set up as much as possible easily It considers as the direct female mold lighting system according to claim 3 characterized by making it a cross-section straight line or a **** bow, and becoming as a single reflector of upward dip.

[0009] This invention makes these the means of the above-mentioned technical-problem solution as a summary of invention, respectively.

[0010]

[Embodiment of the Invention] If this invention is explained still more concretely according to the example of a drawing below, 1 It is the direct female mold lighting system constituted as a liquid crystal back light equipped with the inverter 7 which carries out backlighting of the liquid crystal display side by building in wall tapestry television etc. for example, this direct female mold lighting system 1 So that the reflected light of the light source 3 of concurrency a large number and this light source 3 may be supplied to the lighting side 6, respectively Each light source 3 should be equipped with the reflecting plate 4 which made bilateral symmetry and was made into the common configuration. As ***** this direct female mold lighting system 1 While it shall constitute in a box 2 as a back light unit which carried out wearing formation, the light source 3 shall be depended on the linear light source for example, by the cold cathode fluorescent lamp and the parallel arrangement of much these is carried out to parallel at equal intervals, the lighting side 6 for example, by containing diffuse matter It should have formed by forming with the combination of transparence thru/or a translucent resin plate or a resin plate, such as translucent acrylic resin which carried out surface roughening of the front face, and a diffusion plate, or arranging the about three-light source protection-from-light pattern for brilliance controls in this resin plate etc.

[0011] It is made the upward dip of light source side reflector 5a which the above-mentioned reflecting plate 4 makes this a cross-section horizontal, and supplies the reflected light to the area A of the lighting side 6 at this time, a cross-section straight line, or a **** bow. While having and forming the reflector 5 of 3 partitions in one side of each light source 3 by light source isolation side reflector 5c which makes it the upward dip of medium reflector 5b which supplies the reflected light to the area B of a lighting side, and a cross-section straight line, and supplies the reflected light to the C region of a lighting side While carrying out the polymerization of the above-mentioned area B and the C region to the above-mentioned area A on the basis of the broader-based exposure range of the above-mentioned area A Area B so that the border may be crossed from the mid gear between the contiguity light sources to a contiguity light source side in about 0 - 20%, and a C region to the separation of the light source of the lighting side 6, and the mid gear between the contiguity light sources, respectively in the range of the width of face similarly made into about 0 - 10% While having set up the reflected light supply field in reflector 5c by the side of reflector 5b and light source isolation of the above-mentioned medium, being in this example and setting the above-mentioned area B as narrow from the above-mentioned C region This area B so that it may be located in the mid-gear side between the contiguity light sources from the above-mentioned C region While having set up the reflected light supply field in reflector 5c by the side of reflector 5b and light source isolation of the above-mentioned medium and simplifying the reflector 5 of a reflecting plate 4 as much as possible by this, backlighting of the lighting side 6 shall have been carried out to high brightness and high homogeneity.

[0012] It is in this example and the above-mentioned reflecting plate 4 constitutes the reflector 5 by using the foaming resin of for example, the above-mentioned white. The reflecting plate 5 of this example The above-mentioned foaming resin should be stretched in one to substrates, such as an aluminum plate and a synthetic-resin plate, it should constitute, and this reflecting plate 5 should have formed each reflectors 5a, 5b, and 5c by performing crookedness processing and bow processing suitably in the state of set-up of a substrate condition or foaming resin.

[0013] At this time A reflector 5 is made into the include angle which makes reflector 5c by the side of the light source isolation which adjoins the include angle of reflector 5c by the side of the above-mentioned light source isolation, a right angle, or the acute angle of about 70 degrees or more. The above-mentioned middle reflector 5b the include angle of reflector 5a by the side of the level light source, the above-mentioned right angle, or the acute angle of about 70 degrees or more It should be made the cross-section straight line or the **** bow, and should have considered as the single reflector of upward dip so that reflector 5c by the side of the light source isolation to make might be connected.

[0014] Drawing 2 thru/or drawing 5 are what showed the example using the reflecting plate 5

concerning the above-mentioned configuration, respectively. Each reflectors 5a, 5b, and 5c of a reflecting plate 5 that the brightness by the direct solar radiation from the light source 3 of the lighting side 6 decreases according to the distance for the reflected light of the light source 3 by supplying so that a field may be shared with the lighting side 6, respectively. As what complements reduction in a direct solar radiation so that it may correspond to this reduction as much as possible. Are, are in the example of drawing 2 and drawing 3, and the level surface in a reflecting plate 5. While making reflector 5a by the side of the light source to make into the level surface with a width of face of about several mm from directly under [light source 3], for example, the peak location of reflector 5c by the side of the light source isolation which makes a cross-section straight line is made into a high order from the light source 3. for example, make a projection and its include angle into reflector 5c by the side of adjoining light source isolation, and 74 degrees about 7-9mm from the level surface, and these reflector 5a and middle reflector 5b which makes a cross-section straight line among 5c as what has arranged the level surface and the include angle of about 20 degrees by nothing, for example, width of face of about several mm. So that the reflected light may be supplied to the field A of the wide area carried out to the location which crosses the border about several mm to the light source 3 side which exists and reflector 5a by the side of the above-mentioned light source adjoins by this from the location near the upper part of the light source 3 of the lighting side 6. Carry out and it is made the field of the location where reflector 5c by the side of the isolation light source approached the light source 3 side a little including the abbreviation upper part location of this reflector 5c in the lighting side 6. Supply the reflected light to the field C carried out to from the about three light source location to the mid gear between the contiguity light sources so that it may lap with the above-mentioned field A, and middle reflector 5b makes it narrower than the above-mentioned field C. So that it may lap with the above-mentioned field A in the lighting side 6 selectively with Field B extensively and the reflected light may be supplied to the field B of a up to near the mid gear between the contiguity light sources. It has carried out. At this time these fields B and Field C shall have crossed the border to the contiguity light source 3 side over the mid gear between the light sources, respectively, are in this example, and this border transgression is set to Field B. Are in the distance L and this example of the light source 3 and the mid gear between the contiguity light sources, and it sets to Field C about 17% to about 1.5cm. It has considered as about 1% of width of face, and when Field B and Field C lap with the reflected light of the above-mentioned field A simultaneously in the mid gear between the light sources by this, high brightness and high homogeneity including the mid gear between the light sources are secured.

[0015] While making it a little low rather than it can set the peak location of reflector 5c by the side of the isolation light source which the field A of reflector 5a by the side of the light source which makes the level surface is made for the example of drawing 4 to cross the border to a

contiguity light source side more widely than the thing of above-mentioned drawing 3 , and makes a cross-section straight line to above-mentioned drawing 3 By making the include angle into reflector 5c by the side of adjoining light source isolation, and 90 degrees By carrying out the field C which supplies the reflected light of this reflector 5c to from the about three light source to near the mid gear between the light sources, and making middle reflector 5b into the thing of a cross-section **** bow It is the example which narrowed the field B which supplies that reflected light, and was made into the field near the mid gear between the light sources. At this time the border transgression from the mid gear between the light sources of the above-mentioned field B Similarly the border transgression from the mid gear between the light sources of Field C has been made to make this about 10% for this about 12% to the above-mentioned distance L, and high brightness and high homogeneity including the mid gear between the light sources are secured similarly.

[0016] Drawing 5 about three light source for brilliance controls for example, to a resin plate moreover, for example, by printing the dot pattern of opalescence So that it can use suitable for the same direct female mold lighting system A which arranged the protection-from-light pattern Are the example of the reflecting plate 5 carried out, and distance L of the above-mentioned light source 3 and the mid gear between the contiguity light sources is set to about 2.5cm. While making large the reflecting plate 5 of the light source 3, making a little broad reflector 5a by the side of the light source which makes the level surface and making equivalent to the thing of drawing 2 the peak location of reflector 5c by the side of the isolation light source which makes a cross-section straight line By making the include angle into reflector 5c by the side of adjoining light source isolation, and 90 degrees Middle reflector 5b which makes the field C which supplies the reflected light of this reflector 5c the upper part location of this reflector 5c in the lighting side 6 and the field of a up to near the mid gear between the light sources, and makes a cross-section straight line is made narrow a little. It is the example which made the field B which supplies that reflected light the field near the light source mid gear. At this time the border transgression from the mid gear between the light sources of the above-mentioned field B When the border transgression from the mid gear between the light sources of Field C had similarly been made to make this about 5% for this about 18% to the above-mentioned distance L and the above-mentioned protection-from-light pattern was used, high brightness and high homogeneity including the mid gear between the light sources should be secured similarly.

[0017] In addition, since the complementary of drawing 4 and drawing 5 does not change to the example and basic target which showed drawing 2 and drawing 3 , it attaches the same sign and omits the explanation.

[0018] Thus, are in this example and the light source 3 and the distance L of the mid gear between the light sources are received, respectively in the width of face of the border

transgression from each mid gear between the light sources of the field B in middle reflector 5b, and the field C in reflector 5c by the side of the isolation light source. Although it considered as the range of about 0 - 20%, and about 0 - 10% of width of face, and it considered as about 17% and about 1% of width of face in the example of drawing 3 and being considered as about 18% and about 5% in the example of drawing 5 about 12% and about 10% in the example of drawing 4 When border transgression of either the above-mentioned field B and the field C is less than 0% and does not result in the mid gear between the light sources, muscle-like dark space occurs in this mid gear between the light sources. If it sets up so that homogeneity will be spoiled, and border transgression of Field B may exceed about 20% or border transgression of Field C may exceed about 10% While becoming dark near the mid gear between the light sources and resulting in similarly spoiling homogeneity, even if the difference for how many minutes arises in the gestalt of the lap of Field B and Field C by making border transgression into the thing of the above-mentioned range For example, even if it receives a gaze as a liquid crystal back light, it becomes possible to demonstrate homogeneity good as lighting of a liquid crystal display side.

[0019] Moreover, by being in this example, although the include angle of reflector 5c by the side of the isolation light source was made into the include angle which makes the reflector by the side of the light source isolation which adjoins this, a right angle, or the acute angle of about 70 degrees or more, i.e., 70-degree or more the include angle of 90 or less degree extent, and was made into 90 degrees of a right angle in the example of drawing 4 and drawing 5 74 degrees in the example of drawing 3 This can make the field B which supplies the reflected light by making an include angle into such range the upper part location of as much as possible reflector 5c, and this reflector 5c is used as much as possible effectively. So that the reflected light may be intensively supplied to the dark space by reflector 5a by the side of the direct solar radiation of the light source, and the light source While making middle reflector 5b easy to set up by setting up reflector 5a by the side of the level light source, and reflector 5c by the side of this isolation light source while carrying out and enabling it to secure the homogeneity as the whole as much as possible In order to use further the reflected light of this middle reflector 5b so that the improvement reservation of the homogeneity may be carried out Come out and it is. At this time The 90 above-mentioned degrees When it exceeds, the field C of reflector 5c by the side of the isolation light source the mid gear between the light sources The border is crossed greatly. The width of face of the above-mentioned border transgression Are not suitable for considering as about 0 - 10%. To a contiguity light source side a bright section When it will form, homogeneity will be spoiled and it is less than 70 degrees on the other hand, the other result and the width of face of border transgression are subtracted, and, similarly will not be suitable in the return direction by the side of the light source making width of face of border transgression into the above-mentioned range, and will

form a bright section in it at a light source side, and Field C will spoil homogeneity.

[0020] If it is in the reflecting plate 5 of this example constituted as mentioned above By the medium and isolation light source side having classified three times the light source side in one side of each light source 3, and having inclined the horizontal in the light source side and having made the dip thru/or bow, and isolation light source side incline medium As much as possible the number of reflectors Since it should be simplified, while becoming possible to consider as the light source 3 of a cold cathode fluorescent lamp, and for ** et al. and Reflectors 5a, 5b, and 5c to be able to secure the width of face of extent respectively near several [at least] mm thru/or this, and to easy-ize manufacture of the reflecting plate 5 by the processing and this While leveling reflector 5a by the side of the light source and supplying the reflected light to the wide area of the lighting side 6, while making it lap with the field A of the above-mentioned wide area, the fields B and C of reflected light supply of the lighting side 6 by middle reflector 5b and reflector 5c by the side of the isolation light source By covering the mid gear between the contiguity light sources preponderantly The reflectors 5a and 5b by the side of medium and the isolation light source and the relation between 5c are set up the light source side classified [above-mentioned] three. The brightness which becomes possible [securing the advanced brightness and the homogeneity of a lighting side], and is brought about by [above-mentioned] carrying out simplification, and homogeneous lowering can be canceled, and it can consider as the direct female mold lighting system 1 which makes it high brightness and can realize high homogeneity.

[0021] Although the illustrated example was carried out as above It considers as a thing independent [above-mentioned / made of foaming resin] in operation of this invention, without using the above-mentioned substrate for a reflecting plate, To constitute a reflecting plate with the ingredient of the complementary which has high reflexivity, and the light source are used as a hot cathode fluorescent lamp. A direct female mold lighting system as a thing of the application of a display, a signboard, etc. Addition to a direct female mold lighting system, the light source, a reflecting plate, the concrete construction material of the reflector, a configuration, structures, these relation, and these including constituting etc. can be made into the thing of various gestalten unless it is contrary to the summary of the above-mentioned invention.

[0022]

[Effect of the Invention] Since this invention was constituted as above, invention according to claim 1 In one side of each light source, a medium and isolation light source side classifies the reflector of a reflecting plate three times a light source side, and incline a horizontal in a light source side and a dip thru/or bow, and isolation light source side is made to incline medium. While simplifying the number of reflectors as much as possible, the wide area of a lighting side is received in the reflector by the side of the light source by supposing that it is level. By

covering the mid gear between the contiguity light sources preponderantly, while supplying the reflected light, and making the field of reflected light supply of the lighting side by the middle reflector and the reflector by the side of the isolation light source lap with the field of the above-mentioned wide area Set up the relation between reflectors by the side of medium and the isolation light source the above-mentioned light source side, and the advanced brightness and the homogeneity of a lighting side are secured. While easy-izing manufacture of a reflecting plate, the brightness brought about by [above-mentioned] carrying out simplification and homogeneous lowering can be canceled, and the direct female mold lighting system which makes it high brightness and can realize high homogeneity can be offered.

[0023] In addition to the above, invention according to claim 2 can secure advanced brightness and homogeneous reservation as much as possible easily, and can make them the thing of a desirable gestalt.

[0024] Similarly, in addition to the above, by making the include angle of the reflector by the side of the above-mentioned light source isolation into the thing of the predetermined range, invention according to claim 3 can secure the brightness of the above-mentioned altitude, and homogeneity as much as possible easily, and can be made into the thing of a desirable gestalt while it can simplify a reflector.

[0025] Invention according to claim 4 shall set up a middle reflector as much as possible easily by similarly using the reflector by the side of the above-mentioned light source isolation which carries out contiguity in addition to the above.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the fragmentary sectional view of a direct female mold lighting system.

[Drawing 2] It is the expanded sectional view showing the example [light source / a reflecting plate and] of arrangement.

[Drawing 3] It is the explanatory view showing the condition of the reflected light supply by the reflecting plate.

[Drawing 4] It is the explanatory view showing the condition of the reflected light supply by the reflecting plate concerning other examples.

[Drawing 5] It is the explanatory view showing the condition of the reflected light supply by the reflecting plate concerning other same examples.

[Description of Notations]

1 Direct Female Mold Lighting System

2 Box

3 Light Source

4 Reflecting Plate

5a The reflector by the side of the light source

5b A middle reflector

5c The reflector by the side of the isolation light source

6 Lighting Side

7 Inverter

A The field of reflected light supply

B The field of reflected light supply

C The field of reflected light supply

L The light source and distance of the mid gear between the light sources

[Translation done.]

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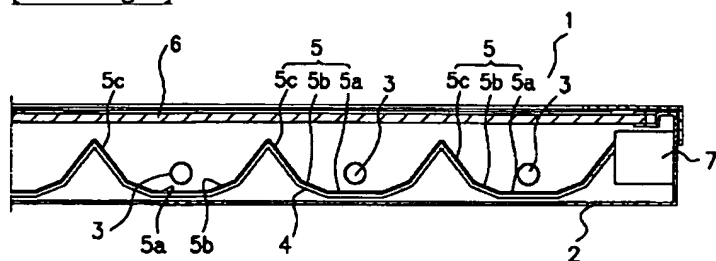
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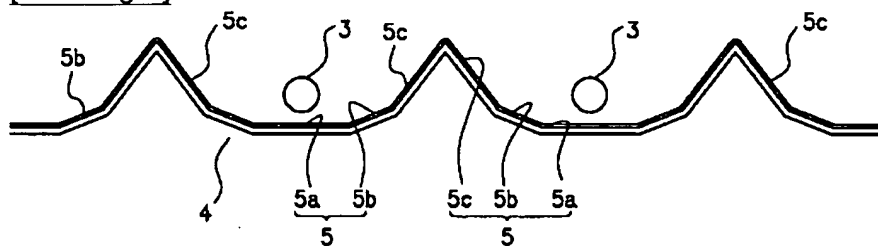
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DRAWINGS

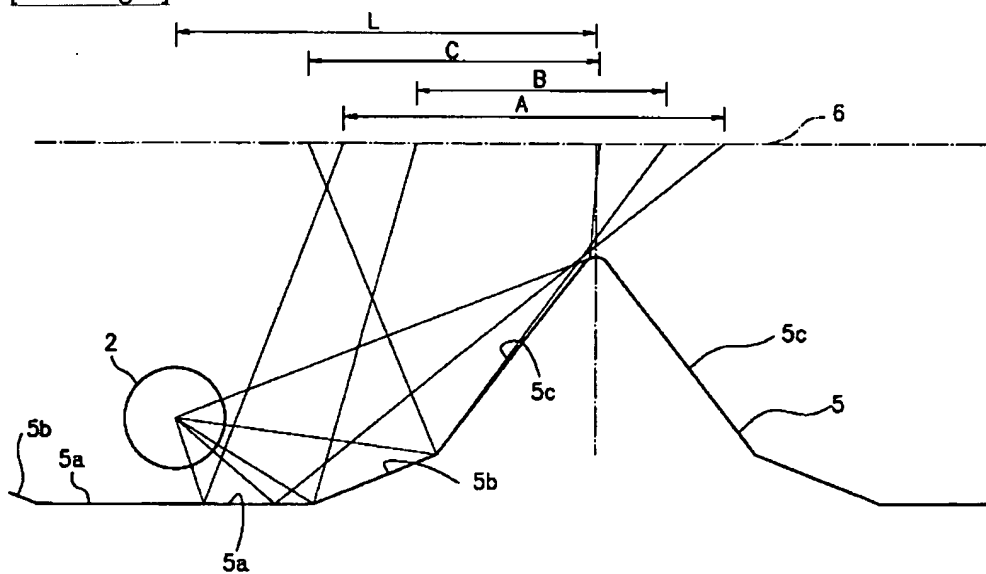
[Drawing 1]



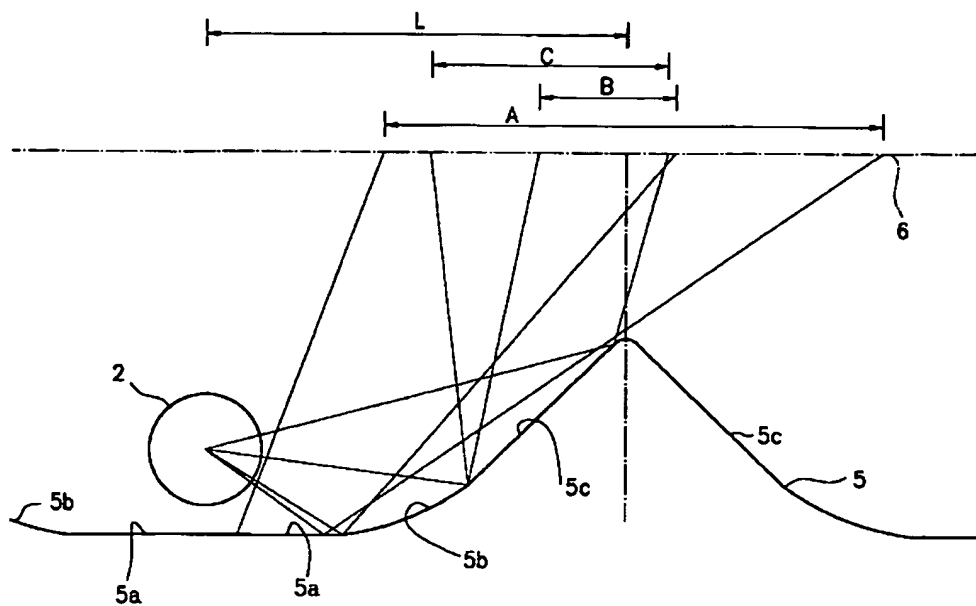
[Drawing 2]



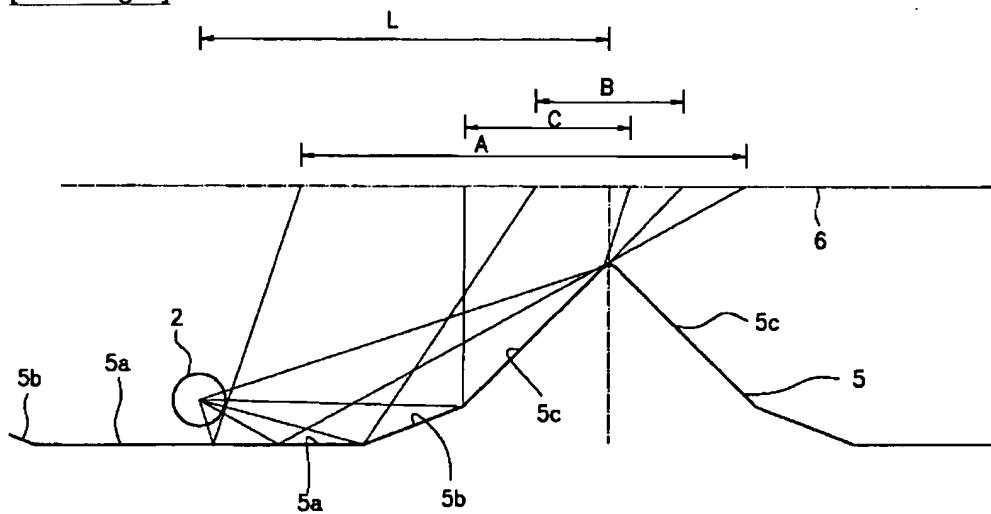
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Translation done.]